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JOINT BOOT TIGHTENING BAND  
[Tsukite yo buto shifuke bando]

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## Claim

\* /1

A joint boot tightening band characterized in that in a joint boot tightening band that is used to tighten a boot attached to the outer periphery of noncircular parts of an outer member that houses a joint part, bulged parts are formed on the inner periphery of the band at the positions that correspond to nonbulged parts formed on the outer periphery of the outer member.

## Detailed explanation of the invention

The present model pertains to a joint boot tightening band that is used with a universal joint. In particular, it pertains to a joint boot tightening band that is suitable for use with a universal joint wherein the outer periphery of an outer member that houses a joint part is formed into a noncircular shape.

When tightening a boot that is attached to an outer member with a noncircular outer periphery, a conventional band made of a simple belt-shaped member is used in the same manner as that with an outer member with a circular outer periphery. However, when tightening boot around the noncircular outer periphery of the outer member using the band with said simple belt-like shape, an insufficient surface pressure is created at a sealing part that is formed between a nonbulged outer member portion of the noncircular outer periphery and the band, and the boot gets deformed unevenly in the circumferential direction, resulting in the risk for grease leakage. Also, there is a problem that it is difficult to set a proper boot tightening margin for the prevention of said grease leakage and a proper sealing part shape. /2

The present model was invented in the light of the aforementioned conventional problem, and its purpose is to present a joint boot tightening band capable of improving the sealing characteristic between the outer member with the noncircular outer periphery and the boot.

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\* [Numbers in right margin indicate pagination of the original text.]

In order to achieve the aforementioned purpose, in the case of the present model, in a joint boot tightening band that is used to tighten a boot attached to the outer periphery of a noncircular part of an outer member that houses a joint part, a bulged part is formed on the inner periphery of the band at the position that corresponds to a nonbulged part formed on the outer periphery of the outer member.

An application example of the present model will be explained below with reference to figures. /3

Figure 1 and Figure 2 are diagrams showing a first application example of the joint boot tightening band pertaining to the present model. Joint part 2 is housed inside of outer member 1, and shaft 3 is connected to joint part 2. Boot 5 is attached to attachment groove 4 formed on the outer periphery of outer member 1 at one end and fixed there as it is tightened using band 6. The other end of boot 5 is fixed to shaft 3 as it is tightened at a part not shown, and grease for lubricating joint part 2 is encapsulated inside of outer member 1 and boot 5.

Here, as for the cross-sectional shape of outer member 1 at the part where boot 5 is attached, as shown in Figure 3, convex surface parts 7, that form the same circumferential surfaces, and planar parts 8, that form chords at the distance of L from the circumferential surfaces formed by convex surface parts 7, are formed alternately at 3 positions, whereby the outer periphery of outer member 1 is formed into a noncircular shape.

In addition, the cross-section of the part that is attached to outer member 1 of boot 5 and tightened using band 6 is formed into the shape shown in Figure 4. That is, the inner surface attached to outer member 1 is slightly smaller than yet analogous to the outer circumferential shape of outer member 1 while comprising concave surface parts 9 to be attached to convex surface parts 7 of outer member 1 and planar parts 10 to be attached to planar parts 8 of outer member 1. In addition, the outer surface part that comes into contact with band 6 is formed into a circular shape. /4

Furthermore, band 6 is formed as a snap-on type of the kind shown in Figure 5; wherein, it is configured with belt-shaped metallic member 11 that is curved into a ring shape with end parts to be

joined together, lever 12 that is fixed to the outer side of one of the joint parts in a slightly overlapping manner, clip 13 that is fixed to belt-shaped member 11, and bulged parts 14 that are joined to or formed as one body with the inner periphery at the parts that correspond to planar parts 8 of outer member 1. Here, the amount bulged part 14 bulges inwardly from belt-shaped member 11 is set to 1.5 L or less. When tightening said snap-on type band 6, lever 12 is tilted and turned in the direction indicated by the arrow while using the outer end part of lever 12 as force point 12A, the inner end of lever 12 as fulcrum 12B, and the point where lever 12 and belt-shaped member 11 are fitted together as working point 12C, whereby moving part 12D on the opposite side is moved gradually via the position of clip 13 on belt-shaped member 11 and lever 12 so as to tighten belt-shaped member 11 by reducing its diameter. /5

Next, function of the aforementioned first application example will be explained. Boot 5 is fitted to the outer periphery of outer member 1, that is configured with convex surface parts 7 where attachment groove 4 is formed and planar parts 8, in such a manner that concave surface parts 9 are fitted to convex surface parts 7, and planar parts 10 are fitted to planar parts 8, respectively. While belt-shaped member 11 is open, band 6 is placed over the outer periphery of boot 5 at the positions where bulged parts 14 match planar parts 8 of outer member 1 and planar parts 10 of boot 5. Then, when fulcrum 12B of lever 12 is brought to an arbitrary part of boot 5, and lever 12 is pushed down, moving part 12D of belt-shaped member 11 moves in the direction the diameter of belt-shaped member 11 is reduced gradually so as to bring concave surface parts 9 of boot 5 into close contact with convex surface parts 7 of outer member 1 and compress the thick parts of boot 5 where planar parts 10 are formed using bulged parts 14 in the manner shown in Figure 2 so as to bring planar parts 10 of boot 5 into close contact with planar parts 8 of outer member 1 in order to tighten boot 5 evenly around the entire circumference of the outer periphery of outer member 1. /6

According to the aforementioned application example, because thick parts of boot 5, that are formed at the positions that correspond to planar parts 8 as nonbulged parts formed on the periphery of outer

member 1, are pressed by bulged parts 14 formed on band 6, the contact pressure generated between outer member 1 and boot 5 is never reduced even at the bulged parts of outer member 1. As such, both components are kept in close contact with each other over the entire circumference, and the contact pressure at the sealed surface is hardly reduced even in the event of deterioration of such a material as rubber that is used to configure boot 5, so that a good sealing characteristic can be assured. In addition, because the sealing characteristic can be assured easily, the shape of the part where the boot is attached to the outer member with said noncircular periphery can be designed easily.

Figure 6 (A), (B), and (C) are diagrams for explaining a second application example of the joint boot tightening band pertaining to the present model. That is, the periphery of outer member 21 is formed into a noncircular shape that comprises convex surface parts 22 and concave surface parts 23 that are recessed inwardly from the contour lines of convex surface parts 22 by distance L. Boot 24 to be attached to said outer member 21 has the cross-sectional shape shown in Figure 6 (B) at the part at which it is attached to said outer member 21; wherein, an inner circumferential shape slightly smaller than the contour line of outer member 21 and an outer circumferential shape that is almost parallel to said inner circumferential shape are formed. Concave surface parts 25, that come into contact with convex surface parts 22 formed on outer member 21, and convex surface parts 26, that come into contact with concave surface parts 23 formed on outer member 21, are formed on the inner periphery of said boot 24. Furthermore, as shown in Figure 6 (C), band 27, that is used to tighten boot 24 fitted to outer member 21, has bulged parts 28 having an inward convex-surface-like shape with a maximum bulging amount of roughly 1.5 L or less that are formed at the parts of the inner periphery that correspond to concave surface parts 23 of outer member 21. Here, band 27 may be of a snap-on type with a lever similar to that shown in the aforementioned first application example, or it may be of a type that involves screws to tighten both ends of a belt-shaped member.

That is, according to the aforementioned second application example, when the diameter of band 27, that is attached to the outer periphery of boot 24, of which concave surface parts 25 are fitted to convex surface parts 22 of outer member 21, and convex surface parts 26 are fitted to concave surface parts 23, while positioned in such a manner that its bulged parts 28 meet concave surface parts 23 of outer member 21 and convex surface parts 26 of boot 24, is reduced, convex surface parts 26 of boot 24 are pushed against concave surface parts 23 of outer member 21, and boot 24 is tightened in close contact with the entire circumference of outer member 21. /8

As described above, in the joint boot tightening band that is used to tighten the boot to be attached to the noncircular periphery of the outer member that houses the joint part, the bulged parts are formed at the positions of the inner periphery of the band that correspond to the nonbulged parts on the outer periphery of the outer member, so that the joint boot tightening band pertaining to the present model creates an effect that the boot can be tightened while attaining a good sealing characteristic with respect to the outer member with the noncircular periphery.

#### Brief description of the figures

Figure 1 is a cross-sectional view showing a first application example of the joint boot tightening band pertaining to the present model; Figure 2 is a cross-sectional view along the II-II line in Figure 1; Figure 3 is a cross-sectional view showing an outer member used in said application example; Figure 4 is a cross-sectional view showing a boot used in said application example; Figure 5 is a front view showing a band used in said application example; and Figure 6 (A), (B), and (C) are diagrams for explaining a second application example of the joint boot tightening band pertaining to the present model. /9

1, 21 ... outer member; 2 ... joint part; 5, 24 ... boot; 6, 27 ... band; and 14 ... bulged part.

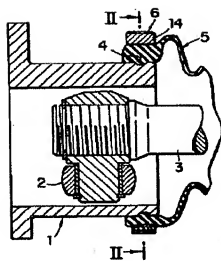


Figure 1

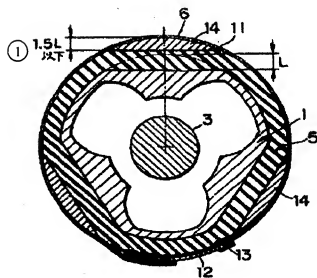


Figure 2

Key: 1 1.5 L or less



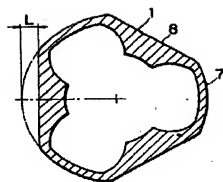


Figure 3

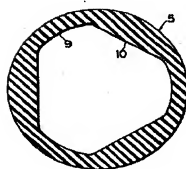


Figure 4

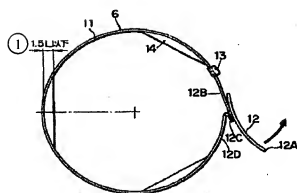


Figure 5

Key: 1 1.5 L or less

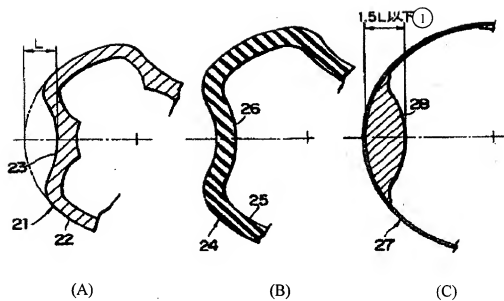


Figure 6

Key: 1 1.5 L or less